

Listing of Claims

Claims 1 – 5 (canceled)

Claim 6 (previously presented): A method of forming a trench for use in manufacturing a semiconductor device, said method comprising:

- forming one of an oxide film, a fluoride film and a nitride film as an insulation film on a substrate;

- forming a photoresist pattern on the insulation film;

- performing a first etching process comprising etching the insulation film through only part of its thickness using the photoresist pattern as a mask to form an initial trench in the insulation film; and

- subsequently performing a second etching process that is distinct from said first etching process, the second etching process comprising wet etching the insulation film, in which the initial trench has already been formed, to thereby enlarge the initial trench by spraying an etching solution onto the insulation layer while the substrate is being rotated.

Claims 7 – 22 (canceled)

Claim 23 (previously presented): A method of forming a conductive pattern for use in manufacturing a semiconductor device, said method comprising:

- forming an insulation film on a substrate;

- forming a photoresist pattern on the insulation film;

- performing a first etching process comprising etching the insulation film through only part of its thickness using the photoresist pattern as a mask to form an initial trench in the insulation film;

- subsequently performing a second etching process that is distinct from said first etching process, said second etching process being a wet etching process and

comprising etching the insulation film, in which the initial trench is already formed, using etching solution including hydrogen fluoride, phosphoric acid and deionized water to thereby enlarge the initial trench; and

depositing a conductive material in the enlarged trench to form a conductive pattern in the insulation film.

Claim 24 (canceled)

Claim 25 (previously presented): A method of forming a conductive pattern for use in manufacturing a semiconductor device, said method comprising:

forming an insulation film on a substrate;

forming a photoresist pattern on the insulation film;

performing a first etching process comprising etching the insulation film through only part of its thickness using the photoresist pattern as a mask to form an initial trench in the insulation film;

subsequently performing a second etching process that is distinct from said first etching process, the second etching process being a wet etching process and comprising etching the insulation film, in which the initial trench is already formed, using an etching solution including benzo triazole to thereby enlarge the initial trench; and

depositing a conductive material, comprising copper, aluminum or tungsten, in the enlarged trench to form a conductive pattern in the insulation film, wherein the etching solution including the benzo triazole prevents the conductive material from oxidizing.

Claims 26 and 27 (canceled)

Claim 28 (previously presented): The method of claim 6, further comprising removing the photoresist pattern after the initial trench is formed and prior to the second etching process.

Claims 29 – 31 (canceled)

Claim 32 (previously presented): The method of claim 6, wherein said enlarging the initial trench comprises increasing a width of the initial trench while maintaining a depth of the initial trench.

Claims 33 and 34 (canceled)

Claim 35 (previously presented): A method of forming a trench for use in manufacturing a semiconductor device, said method comprising:

- forming an insulation film on a substrate;

- forming a photoresist pattern on the insulation film;

- performing a first etching process comprising etching the insulation film through only part of its thickness using the photoresist pattern as a mask to form an initial trench in the insulation film;

- subsequently removing the photoresist pattern; and

- subsequently performing a second etching process that widens the initial trench while maintaining the depth of the trench substantially the same as that of the initial trench, said second etching process being distinct from said first etching process and comprising wet etching the insulation film.

Claim 36 (previously presented): The method of claim 35, wherein said forming of the insulation film comprises forming one of an oxide film, a fluoride film and a nitride film on the substrate.

Claim 37 (previously presented): The method of claim 36, wherein the second etching process comprises immersing the substrate into a bath containing an etching solution.

Claim 38 (previously presented): The method of claim 36, wherein the second etching process comprises spraying an etching solution onto the insulation layer while the substrate is being rotated.

Claim 39 (previously presented): The method of claim 36, wherein said forming of the insulation film comprises forming one of an oxide film and a fluoride film on the substrate.

Claim 40 (previously presented): The method of claim 39, wherein the second etching process comprises wetting the film with an etching solution that includes hydrogen fluoride (HF), ammonium fluoride (NH₄F), hydrogen peroxide (H₂O₂) and deionized water (H₂O).

Claim 41 (previously presented): The method of claim 40, wherein the etching solution includes hydrogen fluoride, ammonium fluoride and deionized water in a volume ratio of about 1:1-10:1-10:100-500.

Claim 42 (previously presented): The method of claim 39, wherein said second etching process comprises etching the insulation film at a rate of about 40 to about 60 Å/minute.

Claim 43 (previously presented): The method of claim 39, wherein the etching solution further comprises an antioxidant.

Claim 44 (previously presented): The method of claim 43, wherein the antioxidant comprises benzo triazole (BTA).

Claim 45 (previously presented): The method of claim 36, wherein said forming of the insulation film comprises forming a nitride film on the substrate.

Claim 46 (previously presented): The method of claim 45, wherein the second etching process comprises wetting the nitride film with an etching solution that includes hydrogen fluoride, phosphoric acid (H_3PO_4) and deionized water.

Claim 47 (previously presented): The method of claim 45, wherein the etching solution further comprises an antioxidant.

Claim 48 (previously presented): The method of claim 47, wherein the antioxidant includes benzo triazole.

Claim 49 (previously presented): The method of claim 35, wherein the second etch process is performed without the use of an etch mask.